

adjacent agricultural lands and is maintained by the Sacramento River West Side Levee District. The levees along this reach are generally at the riverbank, about 300 to 400 feet apart.

The Knights Landing Outfall Gates are located along the right-bank levee about 26 miles downstream from Tisdale Weir. The Knights Landing Outfall Gates (see O&M Manual SAC162), also known as the Sycamore Slough Outfall Gates, are intended to reduce flood risk to the lower Colusa Basin from Sacramento River backwater, but provide drainage to the Sacramento River during low flow. The structure was originally built by local interests. Flap gates were added by USACE and DWR.

The left-bank levee (see O&M Manual SAC128) is about 33.6 miles long. The levee reduces flood risk to adjacent agricultural land. Maintenance is performed by RD 1500.

Fremont Weir

The Sacramento River and the joint channel for the Sutter Bypass and Feather River join at the Fremont Weir. The weir, an SPFC facility, is a fixed-crest concrete structure. At this location, the Sacramento River has a design capacity of 30,000 cfs, and the joint channel for the Sutter Bypass and Feather River has a design capacity of 416,500 cfs, roughly half of which spilled from the Sacramento River to the Butte Basin at the overflow areas south of Chico Landing, and over the Moulton, Colusa, and Tisdale weirs.

The Fremont Weir (see O&M Manual SAC157) is a concrete overflow section about 9,120 feet long with a design capacity of 343,000 cfs. The Fremont Weir begins to spill water to the Yolo Bypass (see Section 3.2.4) when the combined flow from the Sacramento River, Sutter Bypass, and Feather River reaches about 60,000 cfs. This value depends on the amount of flow that each river contributes. The Sacramento River continues on the east side of the weir. The weir is maintained by DWR through Sutter Maintenance Yard.

Sacramento River from Fremont Weir to Sacramento Weir

SPFC facilities along this reach include levees. The design capacity of the Sacramento River in this reach is 107,000 cfs, based on O&M manuals. The

right-bank levee (see O&M Manuals SAC122 and SAC123) is about 18 miles long. The levee is intended to reduce flood risk to adjacent agricultural land and is maintained by RD 1600 and RD 827.

The left-bank levee (see O&M Manuals SAC124 and SAC141.1) is about 17 miles long. The levee is intended to reduce flood risk to the urbanizing area in Natomas and adjoining agricultural land. The levee is maintained by RD 1000. Near the upstream end of the levee, the Natomas Cross Canal enters the river from the east with a design capacity of 22,000 cfs, based on the O&M manual.

The 4.8-mile-long East Side Canal and right-bank levee (see O&M Manual SAC142) and the 4.3-mile-long Pleasant Grove Creek Canal and left-bank levee (see O&M Manual SAC125) collect water from streams approaching RD 1000 (Natomas Basin) and RD 1001, and discharge it into the head of the Natomas Cross Canal. Levees along both sides of the Natomas Cross Canal (see O&M Manuals SAC125 and SAC142) are each about 5 miles long. The East Side Canal levee (design capacity of 16,000 cfs, based on the O&M manuals) and the right-bank levee of the Natomas Cross Canal are maintained by RD 1001. The Pleasant Grove Creek Canal levee (design capacity of 6,000 cfs, based on the O&M manual) and left-bank levee of the Natomas Cross Canal are maintained by RD 1000. The Pleasant Grove Creek Canal left levee was raised in the early 1950s by USACE. The levees described above are intended to reduce flood risk to the Natomas area and nearby agricultural land.



The Sacramento Weir is the only weir that requires manual operation for flow release



SPFC levees protect the Pocket Area of Sacramento

Sacramento Weir and Bypass

The Sacramento Weir and its bypass levees are SPFC facilities. The weir (see O&M Manual SAC158) is a reinforced concrete structure with wooden needles that provide a movable crest. The Sacramento Weir is the only weir and overflow area in the SPFC that requires manual operation for flow release. The weir consists of 48 weir sections, each 38 feet wide, with a total design capacity of 112,000 cfs. Sections of the weir are opened when the Sacramento River reaches or exceeds a stage of 27.5 feet NGVD at the I Street Bridge. The weir was constructed by the City of Sacramento and later adopted into the SRFCP by USACE.

The leveed bypass downstream from the Sacramento Weir extends to the Yolo Bypass. The right-bank levee (see O&M Manual SAC116) is about 1.8 miles long and the left-bank levee (see O&M Manual SAC122) is about 1.8 miles long. The Sacramento Weir and bypass are maintained by DWR through Sacramento Maintenance Yard.

Sacramento River from Sacramento Weir to American River

SPFC facilities along this reach of river include levees on both banks. This reach serves a unique function among all major SPFC channels in that it carries water in both directions, depending on flow conditions. Since the American River enters the downstream end of this reach with a design capacity of 180,000 cfs, and the Sacramento River downstream from the American River has a design capacity of

only 110,000 cfs, a portion of the American River must flow upstream to the Sacramento Weir during large flood events.

The right-bank levee (see O&M Manual SAC116) of the Sacramento River and the left-bank levee (see O&M Manual SAC124) are both about 2.5 miles long. The right-bank levee is intended to reduce flood risk to West Sacramento and is maintained by DWR through Maintenance Area 4 and RD 537. The left-bank levee is intended to reduce flood risk to the Natomas area and is maintained by RD 1000.

Sacramento River from American River to Elk Slough

SPFC facilities along this reach of river include levees. Based on the O&M manuals, the design capacity is 110,000 cfs with 3 feet "or more" of freeboard (transitions to 6 feet near the downstream end of the reach). The right-bank levee (see O&M Manuals SAC113, SAC114, and SAC116) is about 22 miles long. The levee was originally built by local interests and modified to project standards by USACE. The levee is intended to reduce flood risk to West Sacramento near its upstream end, and to adjacent agricultural land. The levee is maintained by RD 307, RD 537, RD 900, RD 765, RD 999, and DWR through Maintenance Area 4.

The left-bank levee (see O&M Manuals SAC111, SAC115, SAC117, and SAC118.1) is about 18 miles long. The levee is intended to reduce flood risk to Sacramento and suburbs to the south. The upstream 4-mile-long (approximately) portion of the

left-bank levee was built by local interests and brought into the project without modification since it equaled or exceeded USACE project standards. The City of Sacramento maintains about 3.6 miles of the left-bank levee. The remaining levee was built by local interests and rebuilt to project standards by USACE, and is maintained by the American River Flood Control District and DWR through Maintenance Area 9.

Sacramento River from Elk Slough to Collinsville

SPFC facilities along this reach include levees. For most of the reach length, the design capacity decreases because of distributary channels as the river enters the Delta. Based on O&M manuals, the design capacity of the river is as follows:

- Downstream from the Elk Slough distributary – 110,000 cfs with 6 feet of freeboard
- Downstream from the Sutter Slough distributary – 84,500 cfs with 6 feet of freeboard
- Downstream from the Steamboat Slough distributary – 56,500 cfs with 6 feet of freeboard
- Downstream from the Georgiana Slough distributary – 35,900 cfs with 6 feet of freeboard
- Downstream from the confluence with the Yolo Bypass – 579,000 cfs with 6 feet of freeboard
- Downstream from the Three Mile Slough distributary – 514,000 cfs with 6 feet of freeboard

The right-bank levee along the Sacramento River (see O&M Manuals SAC104, SAC110, and SAC112) is about 20 miles long. The levee was constructed by local interests and enlarged, set back, or repaired to project standards by USACE. There is no right-bank levee downstream from the confluence with the Yolo Bypass. The levee is intended to reduce flood risk to adjacent agricultural land in the Delta and is maintained by RD 3, RD 150, and RD 349.

The left-bank levee along the Sacramento River (see O&M Manuals SAC101, SAC102, SAC103, and SAC111) is about 38 miles long. The levee was constructed by local interests and enlarged, set back, or repaired to project standards by USACE. The levee is intended to reduce flood risk to adjacent agricultural areas in the Delta and is maintained by RD 369, RD 551, RD 554, RD 556, RD 755, the Brannan-Andrus Levee Maintenance District, and DWR through Maintenance Area 9.



The Sacramento River near Walnut Grove
(photo courtesy of Aquaforia)

SPFC levees on distributary channels include the following:

- Levees on both banks of Elk Slough (see O&M Manuals SAC112 and SAC113); design capacity of 0 cfs. RD 999 maintains 9.7 miles of right-bank levee and RD 150 maintains 9.6 miles of left-bank levee.
- Levees on both banks of Sutter Slough (see O&M Manuals SAC105, SAC110, SAC112, and SAC113); design capacity of 25,500 cfs (between Miner Slough and the Sacramento River) and 15,500 cfs (between Steamboat Slough and Miner Slough). RD 999 maintains 3.8 miles of right-bank levee and RD 349 maintains 6.6 miles of left-bank levee. RD 501 maintains 2.3 miles of right-bank levee and RD 150 maintains 0.5 mile of left-bank levee along Sutter Slough.
- Levees on both banks of Miner Slough (see O&M Manuals SAC105 and SAC113), a distributary of Sutter Slough; design capacity of 10,000 cfs to Yolo Bypass. RD 999 maintains 2.3 miles of right-bank levee and RD 501 maintains 7.8 miles of left-bank levee.
- Levees on both banks of Steamboat Slough (see O&M Manuals SAC104, SAC105, SAC110); design capacity of 28,000 cfs upstream from Miner Slough and 43,500 cfs downstream from Miner Slough. RD 349 maintains 4.4 miles of right-bank levee, RD 501 maintains 6.8 miles of left-bank levee, and RD 3 maintains 11 miles of left-bank levee along Steamboat Slough.

- Levees on both banks of Georgiana Slough (see O&M Manual SAC103); design capacity of 20,600 cfs. RD 556 maintains 5.5 miles of right-bank levee, the Brannan-Andrus Maintenance District maintains 6 miles of right-bank levee, and RD 563 maintains 12.4 miles of left-bank levee.
- Levees on both banks of Three Mile Slough (see O&M Manuals SAC101 and SAC102); design capacity of 65,000 cfs. RD 341 maintains 3.3 miles of right-bank levee and RD 1601 maintains 2.5 miles of left-bank levee.

Sacramento River Bank Protection Project

The SRBPP is a continuing construction project of the Board and USACE. The purpose of the project is to protect/preserve the integrity of the SRFCP's levee system.

Phase 1 of the SRBPP was authorized in 1960. It was constructed from 1963 to 1975, and consisted of 430,000 linear feet of completed bank protection work. Phase 2 was authorized in 1974 to construct 405,000 linear feet of bank protection. In 2007, the authorized length was increased by 80,000 linear feet, bringing the authorized bank protection length of Phase 2 to a total of 485,000 linear feet. Construction began in 1976 and, over time, the Board provided assurances of cooperation to USACE separately for each element of the work, as each was developed for construction. For Phase 2, nearly 400,000 linear feet of work has been completed at various locations of the SRFCP to date. The types of bank protection measures applied varied throughout the system.

Construction included 11 rivers and waterways: (1) American River, (2) Bear River, (3) Colusa Basin, (4) Elder Creek, (5) Feather River, (6) Georgiana Slough, (7) Miner Slough, (8) Murphy's Slough, (9) Sacramento River, (10) Steamboat Slough, and (11) Sutter Slough.

The completed works are maintained by the agencies responsible for the maintenance of adjacent levees.

3.3 SPFC Facilities in the San Joaquin River Basin

This section provides a reach-by-reach description of SPFC facilities in the San Joaquin River Basin. Descriptions are provided for the Chowchilla and Eastside bypass system and for the San Joaquin River. Tributary and distributary flow points are identified along each flow path.



SPFC facilities in the San Joaquin River Basin include the Eastside Bypass Control Structure

The Standard O&M Manual for the Lower San Joaquin River and Tributaries Project specifies general levee dimensions that were used for the original project design. These dimensions include a general crown width of 20 feet, with side slopes of 2:1 on the waterside, and 3:1 on the landside. Exceptions to these dimensions are noted in the unit-specific O&M manuals and as-constructed dimensions provide an even better indication of how the levees were actually built.

An index map of the San Joaquin River Basin showing the two major watersheds, which include SPFC facilities, is included as Figure 3-12.



Figure 3-12. Index Map of the San Joaquin River Basin Including the Two Major Watersheds With Facilities of the State Plan of Flood Control